

TWO NEW SPECIES OF *PHYLLOPHAGA* HARRIS (COLEOPTERA:  
SCARABAEIDAE: MELOLONTHINAE) FROM SOUTH CENTRAL MEXICO

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**Abstract.**—*Phyllophaga (Chlaenobia) rzedowskiana*, new species, is described from remnants of deciduous tropical forests at 940–1,145 m altitude at seven localities of southwestern Puebla and eastern and southeastern Morelos, México; it is included in the species group “*vexata*.” *Phyllophaga (Listrochelus) barrerana*, new species, is described from remnants of deciduous tropical forests at 1,000–1,210 m altitude at five localities of southern State of Mexico, southeastern Morelos, and southwestern Puebla, México; it is included in the species group “*cavata*.” Drawings of the head, pronotum, abdomen, tarsal claws, and genital structures are provided.

**Resumen.**—Se describe *Phyllophaga (Chlaenobia) rzedowskiana* nueva especie, procedente de los remanentes de bosques tropicales caducifolios localizados entre los 940 y 1,145 m de altitud en siete localidades del suroeste de Puebla, del este y sureste de Morelos, México; la que se agrega al grupo de especies “*vexata*.” También se describe *Phyllophaga (Listrochelus) barrerana* nueva especie, procedente de los remanentes de bosques tropicales caducifolios ubicados entre los 1,000 y 1,210 m de altitud en cinco localidades al sur del Estado de México, el sureste de Morelos y el suroeste de Puebla, México; la cuál se incorpora al grupo de especies “*cavata*.” Se incluyen ilustraciones de la cabeza, pronoto, abdomen, uñas tarsales y estructuras genitales.

**Key Words:** May beetles, *Phyllophaga*, taxonomy, deciduous tropical forests, México

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A large area between the Mexican states of Morelos, Puebla, Guerrero, and Oaxaca (approximately 17°30'–19°N 98°–99°45'W) is known as the upper basin of the Rio Balsas. This area is especially interesting because it represents a transition between species from the tropical deciduous forests, widely extended along the lower Pacific slopes and lower basin of the Balsas River, species from the pine-oak forests located along the Neovolcanic Axis and Sierra Ma-

dre del Sur, and species from the xeric scrubs extended across the Tehuacan, Acatlán, and Huajuapán valleys.

Thirty species of the genus *Phyllophaga* Harris (*sensu lato*) have been listed from southwestern Puebla (Morón and Aragón 1997; Morón 1992, 1998; Aragón et al. 1998; Morón et al. 2000), and twenty species have been found in southeastern Morelos (Deloya and Morón 1994, 1998; Pérez-García 1999), but the adjacent areas

of Guerrero and Oaxaca included in the upper basin of the Balsas River remain poorly collected.

Field work during 1999 at Puebla localities and curatorial work of some Mexican collections during 2000–2002 led to the discovery of two undescribed species of *Phyllophaga*, apparently restricted to the upper basin of the Balsas River. Below, we give descriptions of males and females of one new species of *P.* (*Chlaenobia* Blanchard), and males and females of one new species of *P.* (*Listrochelus* Blanchard).

The characters and terms used in the descriptions are those of Chapin (1935), Saylor (1940), and Morón (1986, 1992). Drawings were made with the aid of a camera lucida and Zeiss stereomicroscope; measurements were obtained with an ocular micrometer or caliper.

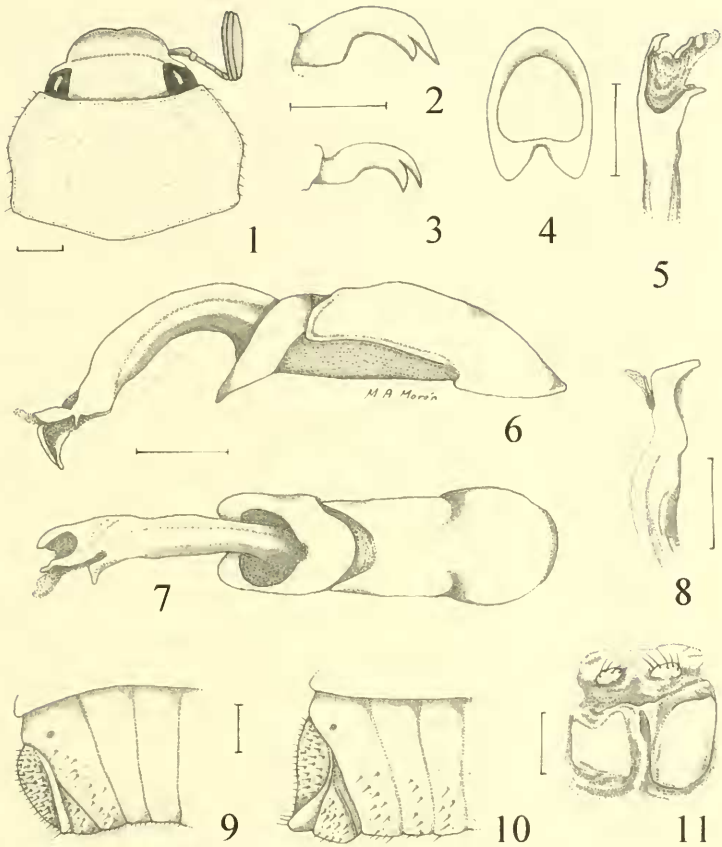
Acronyms used in the text are as follows: CAS, California Academy of Sciences, San Francisco; CNC, Canadian National Collection, Ottawa; HAHC, Henry and Anne Howden, Canadian Museum of Nature, Ottawa; IBUNAM, Instituto de Biología, UNAM, México City; IEXA, Instituto de Ecología, Xalapa, México; MHNM, Museo de Historia Natural, México City; MXAL, private collection M.A. Morón, Xalapa, México; UNSM, University of Nebraska State Museum, Lincoln.

*Phyllophaga (Chlaenobia) rzedowskiana*  
Aragón and Morón, new species

(Figs. 1–11)

Description.—*Holotype male*: Clypeus and frons yellowish brown; pronotum shiny yellowish; elytron straw yellowish without macroscopic vestiture, glabrous; mouthparts, sterna, pygidium and legs shiny straw yellowish. Clypeus 2.5× wider than long, anterior border slightly sinuate, with elevated margin (Fig. 1), disk surface glabrous, slightly concave at sides, with many uniformly distributed, deep, rounded punctures. Frontoclypeal suture slightly sinuate and deeply impressed. Frons 2.1× wider than long, gla-

brous, convex, regularly and deeply punctate. Vertex without punctures. Antenna 9-segmented (Fig. 1), with 3-segmented club, lamellae 1.5× longer than length of preceding five segments combined. Frons 3.1× wider than dorsal diameter of each eye. Eye canthus long and narrow, with 11–12 setae. Labrum bilobed, deeply sinuate, with scattered long, slender setae on borders. Mentum slightly concave, impunctate, with scarce lateral setae, anterior border slightly sinuate. Pronotum 1.6× wider than long and 2.5× wider than frons. Pronotal disk shiny, with round, moderately deep punctures, irregularly distributed; lateral borders widely angulated, lateral marginal bead with scattered, short, slender setae; basal bead strongly indicated, inclusive in front of scutellum where indicated by deep punctures; anterior angles obtuse, not prominent; posterior angles not directed downward, obtuse. Scutellum 1.2× wider than long, with small punctures irregularly distributed. Elytron 2.7× longer than wide, shiny, glabrous, densely rugo-punctate; punctures small, shallow, separated by 1–2 diameters; epipleural border progressively narrowed along complete margin, with a nearly homogeneous fringe of slender setae; humeral callus rounded, prominent; apical callus rounded. Metathoracic wings completely developed. Propygidium slightly shiny, yellowish with shallow punctuation and scattered short setae. Pygidium convex, mainly towards basal border (Fig. 9), shiny, densely punctate, with many short, erect setae on disk; apical margin with 8 long, slender setae; basal margin incomplete at middle. Pterosternum with moderately dense, long yellowish setae. Visible abdominal sternites II to IV of similar length, slightly flattened, with dense, short setae at middle; sternite V flattened, slightly longer than preceding sternite, with short setae at middle and one row of long setae toward posterior border. Anal plate nearly as long as preceding sternite, convex, slightly fur-



Figs. 1-11. *Phyllophaga (Chlaenobia) rzedowskiana*. 1. Male head and pronotum, dorsal view. 2. Male protarsal claw, lateral view. 3. Female protarsal claw, lateral view. 4. Parameres, distal view. 5. Apex of aedeagus, ventral view. 6. Genital capsule, right lateral view. 7. Genital capsule, dorsal view. 8. Apex of aedeagus, left lateral view. 9. Male abdomen, lateral view. 10. Female abdomen, lateral view. 11. Female genital plates, ventral view. Scale lines = 1 mm, except Figs. 2-3 = 0.5 mm.

rowed at midline, with scattered, long setae, posterior margin poorly indicated at sides. Protibia shorter than protarsus (0.53:1), with external border tridentate, proximal tooth much shortened, preapical spur narrow, nearly straight, apex acute, half as long as 2nd protarsomere. Mesotibia with one oblique, sharp, setiferous

carina on external side; upper apical spur straight, narrow, and  $1.1\times$  longer than lower spur. Metatibia shorter than metatarsus (0.75:1), with one oblique, sharp, setiferous carina on external side; upper apical spur lanceolate, slightly curved, apex acute, nearly as long as basal metatarsomere, and  $1.3\times$  longer than lower

spur; lower apical spur articulated with tibial border, with acute apex. Tarsomeres nearly cylindrical, elongate, with enlarged apices, with some setae apically and two lines of thick setae on ventral side. Protarsal claws narrowly cleft (Fig. 2), with lower tooth shorter than upper tooth; meso- and metatarsal claws with lower tooth slightly shorter than upper tooth. Genital capsule with short parameres (Figs. 4, 6–7), dorsally and ventrally fused, symmetrical, apex of each paramere widely rounded and directed downward. Aedeagus with sclerotized, tubelike support, and three, angled, apical projections, one of them notably largest, with apex directed downward (Figs. 5–8). Tectum enlarged, widely convex. Length of genital capsule from apex of parameres to border of basal piece: 3.7 mm. Total body length: 12.0 mm. Humeral width: 5.0 mm.

*Allotype female:* Similar to male except as follows: antenna with lamella of segments 7–9 slightly shorter than the length of five preceding segments combined. Visible abdominal sternites II to V convex, with scattered setiferous punctures near middle; anal plate convex, with scattered setiferous punctures, and 6 slender setae at posterior border. Complete surface of pygidium with many erect setae; basal half convex, distal half with deep concavity at middle, with 8 slender setae along apical border (Fig. 10). Protibia with teeth of external border slightly longer than in male. Both apical spurs of metatibia articulated, wide, lanceolate and curved. Protarsus slightly longer than protibia (1.12:1). Tarsal claws similar on all legs; lower tooth slightly shorter than upper (Fig. 3). Ventral genital plates convex, poorly sclerotized, nearly symmetrical, without setae, apical borders briefly sinuated; dorsal genital plates small, with long setae on distal border (Fig. 11). Total body length: 12.1 mm. Humeral width: 5.0 mm.

*Variation.*—*Male:* Similar to holotype except as follows: sclerotized preapical projections of aedeagus more or less narrower

or longer. Total body length: 11.8–12.3 mm; humeral width: 4.9–5.2 mm. *Female:* similar to allotype except head and pronotum light reddish brown, disc and apical border of anal plate with more or less setae. Total body length: 12.0–12.5 mm; humeral width: 5.0–5.3 mm.

*Type material.*—Described from 51 ♂, 54 ♀. Holotype ♂ MXAL: México: Puebla, Atencingo, Chietla, 1,145 m, 30-V-1999, A. Aragón. Allotype ♀ MXAL: same data as holotype. Paratypes CAS, CNC, HAHC, IBUNAM, IEXA, MXAL, MHNM, UNSM: México: Morelos, Emiliano Zapata, 10-VI-78, F. Cervantes (3 ♂); Huautla, 2.5 km N and 4 km W Estación CEAMISH, 940 m, 8/12-VI-1996, A. Pérez (3 ♂ 2 ♀); Huautla, Estación CEMISH, 2.5 km N 4 km W, 940 m, 8-12-VI-1996, luz, A. Pérez (11 ♂, 5 ♀); Zacatepec, Galeana, 28-VI-1983, C. Deloya (6 ♂ 8 ♀); same data except 27-VI-1983 (3 ♂ 6 ♀); 3-VII-1983 (1 ♂ 1 ♀); 4-VII-1983 (1 ♂); Acamilpa, Tlaltizapan, 27-VI-1983, C. Deloya (1 ♂); Jojutla, Cerro del Higuero, 4-VII-1982, C. Deloya (1 ♂); Jojutla, 9-VIII-1983, C. Deloya (1 ♂ 1 ♀); 26-VI-1983 (1 ♂); Jojutla, Unidad Morelos, VI-1988, C. and G. Deloya (18 ♂ 30 ♀).

*Type locality.*—Chietla, Atencingo municipality, State of Puebla, México (approx. 18°31'N; 98°35'W).

*Distribution.*—Southwestern Puebla, eastern and southeastern Morelos, México (Fig. 12).

*Biological Data.*—Males and females of *P. rzedowskiana* were collected at white fluorescent lights and Hg lights near remnants of tropical deciduous forests, that include species of *Bursera*, *Pseudosmodium*, *Amphipterygium*, *Lysiloma*, *Ceiba*, *Acacia*, *Ipomoea*, *Lemaireocereus*, *Cephalocereus*, and *Pachycereus* (Rzedowski 1978), surrounded by sugarcane plantations, at 940–1,145 m altitude. Phenology: May (2), June (97), July (4), August (2). Other species of *Phyllophaga* flying at the same time and place were *P. (Chlaenobia) howdeniana* Morón, *P. (Phyllophaga) bre-*

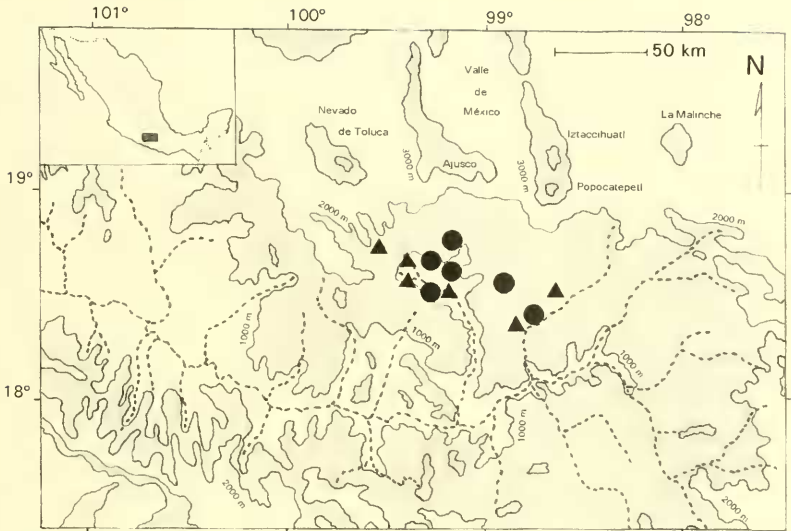


Fig. 12. Distribution of *Phyllophaga* (*C.*) *rzedowskiana* (●) and *P.* (*L.*) *barrerana* (▲) in the Upper Basin of Balsas River, México. Dotted lines represent the approximate flow of the Balsas River and its main tributaries. Map adapted from García and Falcón (1974).

*videns* (Bates), *P.* (*Phyllophaga*) *illuicaminai* Morón, and *P.* (*Listrochelus*) *barrerana*, n.sp.

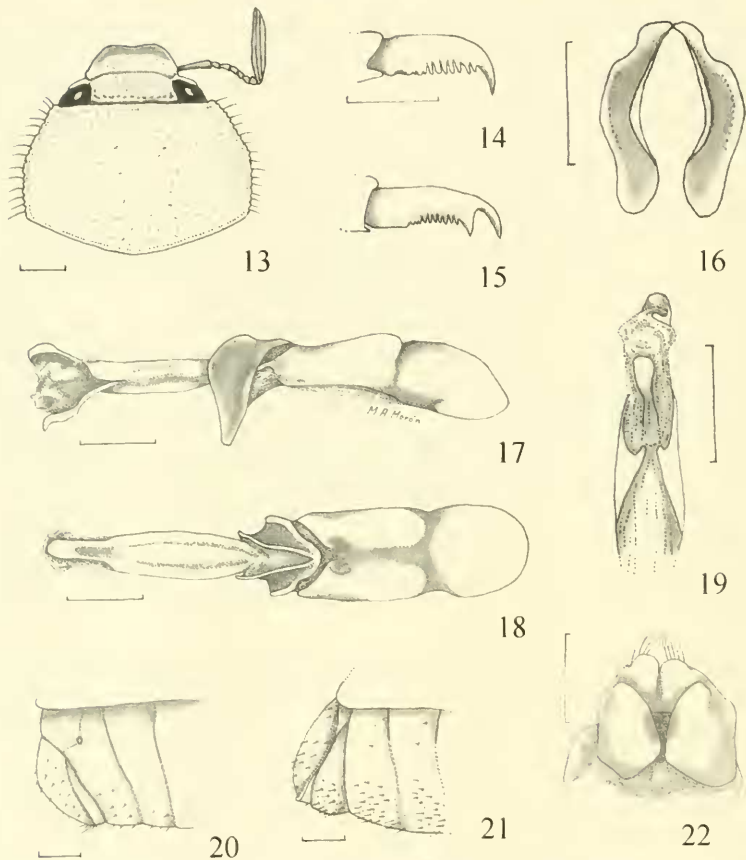
Remarks.—*Phyllophaga* (*Chlaenobia*) *rzedowskiana* belongs to the species group "vexata" (sensu Morón 1986). By body shape, size, color, general vestiture, punctuation on the clypeus, pronotum and elytra, as well as the general shape of the male genital capsule, it is similar to *P.* (*Chlaenobia*) *howdeniana* Morón. But the short parameres with rounded apex, the three irregular projections at the apex of the sclerotized support of aedeagus (see Morón 1992, figs. 8–10) and the shallow, preapical depression in the pygidium of the female, with small, rounded prominences at each side separate *P. rzedowskiana* from *P. howdeniana*.

Etymology.—This new species is dedicated to Dr. Jerzy Rzedowski, a well-known Mexican botanist, whose pioneering studies

on the xeric vegetation and deciduous tropical forests from México are continuous references to scientists and students.

*Phyllophaga* (*Listrochelus*) *barrerana*  
Aragón and Morón, new species  
(Figs. 13–22)

Description.—*Holotype male*: Clypeus and frons reddish brown; pronotum shiny reddish yellow; elytron straw yellowish without macroscopic vestiture, glabrous; mouthparts, sterna, pygidium and legs shiny reddish yellow. Clypeus 2.8× wider than long, anterior border brief and widely sinuate, with elevated margin (Fig. 13), disk surface glabrous, slightly concave at sides, with uniformly distributed, deep, rounded punctures. Frontoclypeal suture slightly sinuate and finely impressed. Frons 2.7× wider than long, glabrous, nearly flattened, irregularly and deeply punctate; transverse carina of vertex strongly indicated; surface



Figs. 13-22. *Phyllophaga (Listrocheilus) barrerana*. 13, Male head and pronotum, dorsal view. 14, Male protarsal claw, lateral view. 15, Female protarsal claw, lateral view. 16, Parameres, distal view. 17, Genital capsule, right lateral view. 18, Genital capsule, dorsal view. 19, Apex of aedeagus, ventral view. 20, Male abdomen, lateral view. 21, Female abdomen, lateral view. 22, Female genital plates, ventral view. Scale lines = 1 mm, except fig. 14 = 0.5 mm.

behind carina with scattered, small punctures. Antenna 10-segmented (Fig. 13), with 3-segmented club, lamellae  $1.4\times$  longer than length of preceding six segments combined. Frons  $2.5\times$  wider than dorsal diameter of each eye. Eye canthus long and narrow, with 12 setae. Labrum bilobed,

widely sinuate, with scattered long, slender setae on borders. Mentum slightly concave, impunctate, with scarce lateral setae, anterior border briefly sinuate. Pronotum  $1.5\times$  wider than long and  $2.6\times$  wider than frons. Pronotal disk shiny, with round, shallow punctures, irregularly distributed, leaving

an impunctate mesial strip on anterior half; lateral borders widely angulated, lateral marginal bead crenulate, with slender setae; basal bead strongly indicated, inclusive in front of scutellum where it is indicated by deep punctures; anterior angles obtuse, slightly prominent; posterior angles obtuse, widely rounded. Scutellum  $1.2\times$  wider than long, with small punctures apically. Elytron  $2.4\times$  longer than wide, shiny, glabrous, rugo-punctate; punctures small, shallow, separated by 2–4 diameters; epipleural border progressively narrowed along complete margin, with a fringe of slender setae; humeral callus rounded, prominent; apical callus rounded. Metathoracic wings completely developed. Propygidium slightly shiny, yellowish with shallow and scattered setiferous punctures. Pygidium uniformly convex (Fig. 16), shiny, with scattered, shallow punctures and short setae on disk; apical margin with 10 slender setae; basal margin incomplete at middle. Pterosternum with dense, long yellowish setae. Visible abdominal sternites II to IV of similar length, slightly flattened, with scattered, short setae near middle; sternite V flattened, slightly longer than preceding sternite, with scarce, short setae, shallowly furrowed at midline of posterior half, and with posterior border briefly notched. Anal plate much narrowed (Fig. 16), with scattered, shallow setiferous punctures, briefly furrowed at midline. Protibia shorter than protarsus (0.51:1), with external border tridentate, proximal tooth much shortened, preapical spur narrow, nearly straight, apex acute,  $0.6\times$  as long as 2nd protarsomere. Mesotibia with one oblique, sharp, setiferous carina on external side; upper apical spur straight, narrow, as long as lower spur. Metatibia shorter than metatarsus (0.8:1), with one oblique, sharp, setiferous carina on external side; upper apical spur sinuate, apex acute,  $1.4\times$  longer than basal metatarsomere, and  $1.2\times$  longer than lower spur; lower apical spur articulated with tibial border, with acute apex. Tarsomeres nearly cylindrical, elongate, with enlarged apices, with some setae sub-

apically, and scattered setae on ventral side. All tarsal claws irregularly unipectinate (Fig. 14). Genital capsule with short parameres (Figs. 15, 18–19), dorsally fused, symmetrical, with strong carinae along dorso-distal border and lateral border, apex of each paramere widely rounded and directed downward. Tectum with shallow, wide sulcus along midline and rounded prominences basally (Fig. 18). Aedeagus with sclerotized, tubelike support, with dorsal preapical projection, and one subapical, slightly asymmetrical sclerite (Figs. 17–19). Length of genital capsule from apex of parameres to border of basal piece: 3.8 mm. Total body length: 11.2 mm. Humeral width: 5.0 mm.

*Allotype female*: Similar to male except as follows: antenna with lamella of segments 8–10  $0.8\times$  longer than length of preceding seven segments combined. Anal plate large and convex, with short setae. Pygidium moderately convex with scattered setiferous punctures (Fig. 21). Tarsal claws with acute tooth before the middle of ventral border, and posterior border unipectinate (Fig. 15). Ventral genital plates with posterior border narrowed, with rounded apex, glabrous. Dorsal genital plates with apical border widely curved, briefly notched, with erect setae at apex (Fig. 22). Total body length: 13.2 mm. Humeral width: 5.8 mm.

*Variation*.—Male specimen from Ixtapan de la Sal similar to holotype except as follows: pronotal and elytral punctures deeper; carinae of the parameres more elevated. Total body length in both sexes: 13.0–13.5 mm; humeral width in both sexes: 5.6–5.9 mm.

*Type material*.—Described from 24 ♂ 3 ♀. Holotype ♂ MXAL: México: Puebla, Tilapa, Casa Blanca, 1,210 m, 30-V-1999, A. Aragón. Allotype ♀ MXAL: México: Morelos, Acamilpa, Tlaltizapán, 27-VII-1983, C. Deloya. Paratypes CAS, CNC, HAHC, IBUNAM, IEXA, MXAL, MHNM, UNSM: same data as holotype (2 ♂); México: Puebla: Chietla, Atencingo,

1,145 m, 30-V-1999, A. Aragón (2 ♂); Estado de México, Ixtapan de la Sal, 29-V-1971, A. Barrera (1 ♂); México: Morelos: Jojutla, Unidad Morelos, VI-1988, C. and G. Deloya (1 ♂); Jojutla, 9-VIII-1983, C. Deloya (1 ♂); Zacatepec, Galeana, 28-VI-1983, C. Deloya (5 ♂); same data except 27-VI-1983 (1 ♂); Acamilpa, Tlaltizapan, 27-VII-1983, C. Deloya (10 ♂ 2 ♀).

Type locality.—Tilapa, Atencingo municipality, state of Puebla, México (aprox. 18°34'N; 98°32'W).

Distribution.—Southwestern Puebla, southern México and southeastern Morelos, México (Fig. 12).

Biological Data.—Males of *P. barrerana* were collected at white fluorescent lights near remnants of tropical deciduous forests, that include species of *Bursera*, *Pseudomodinium*, *Amphipterygium*, *Lysiloma*, *Ceiba*, *Acacia*, *Ipomoea*, *Lemaireocereus*, *Cephalocereus*, and *Pachycereus* (Rzedowski 1978), surrounded by sugarcane plantations, or avocado and mango plantations, at 1,145–1,210 m altitude. Phenology: May (6), June (7), July (13), August (1). Other species of *Phyllophaga* flying at the same time and place were *P. (Chlaenobia) howdeniana* Morón, *P. (Chlaenobia) rzedowskiana* Aragón and Morón, *P. (Phyllophaga) brevidens* (Bates), and *P. (Phyllophaga) illuicaminai* Morón.

Remarks.—*Phyllophaga (Litrochelus) barrerana* belongs to the species group "cavata" (*sensu* Morón 1986). By body shape and size, punctuation on the clypeus, pronotum and elytra, structure of pygidium, as well as the general shape of the male genital capsule, it is similar to *P. (Litrochelus) valia* Saylor and *P. (L.) cochisa* Saylor. But the pruinose elytra with basal, erect setae; pruinose and setiferous pygidium; parameres with acute apices curved inward; and wide sclerotized support of the aedeagus with the apex abruptly narrowed, separate *P. valia* from *P. barrerana*. The male antennal club as long as the preceding six segments combined; non-furrowed anal plate; parameres with enlarged, nearly

parallel, acute apices; and narrow sclerotized support of aedeagus without apical reduction, separate *P. cochisa* from *P. barrerana*.

Etymology.—This new species is dedicated to the late Dr. Alfredo Barrera (1926–1980), well known Mexican entomologist, ethnobiologist, teacher and promoter of the biological sciences, whose publications on the taxonomy of Siphonaptera, scientific collections, natural history museums, ecology of tropical vegetation, and Mayan ethnobotanical nomenclature, are classical references.

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